Digital Devices, Student Behavior, and Student Learning

What’s happening in your classroom that you probably haven’t noticed

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ABSTRACT

Due to the integration of technology into university life, more students are using laptops and cell phones in class. One preliminary study in an engineering class found that students who took notes on laptops earned a full grade lower than those who used pen and paper. While many undergraduates believe they are multi-tasking, research suggests students cannot multi-task nearly as effectively as they think they can (Ophir, Nass, and Wagner 2009). Utilizing a mixed methods design (observation, surveys, semi-structured interviews), we assessed the effects of technology use on student attitudes and learning. Results show no correlation between note taking method and grades, but a significant negative correlation between cell phone use and final grade. Students who self-reported never using cell phones in class earned nearly half a letter grade higher (0.36 ± 0.08 on 4.0 scale) than those who reported use of a cell phone during lecture. The frequency of use among phone users is nearly 7 times per hour, much higher than faculty noticed.

Classroom Observation Data

- 70% - 80% of students took notes with pen and paper
- 5% - 15% took notes on a laptop or some other electronic device
- About 5% of students did not take notes during class
- Non-course-related technology use involves cell phone use much more than laptop use, averaging close to 7 times/hr. for students who use phones
- Technology use includes but is not limited to texting, web browsing, social networking, shopping, playing games

Research Questions

- Do note-taking methods affect students’ final grades?
- Does cell phone use affect learning performance?
- How does the use of laptops and cell phones affect other students?

Did we find a drop in grades among laptop users?

No: There was no statistically significant difference in the final grades of laptop users vs. pen & paper/non-note takers across three courses studied in the fall of 2009. Laptops were used by only 5-15% of these students; however, observation and interview data confirm more students are distracted by cell phone use.

Conclusion: In-class phone use is significantly correlated with reduced learning outcomes.

- About 75% of students report regular in-class use
- On anonymous surveys students report using their phones an average of 3-5 times per hour
- Observation indicates this average is closer to 7 times per hour!

Methods

In 2009-2010, we studied eight large Astronomy & Geology courses that used student response systems (clickers) and Think-Pair-Share exercises to engage students. Methods included classroom observations (31 observation days), anonymous survey data collected from 3 courses (N=345), and interviews with 24 undergraduates.

Interview Data

“I could probably take notes on a computer, but I don’t, because I find it a distraction. It’s really easy to be doing other things in class than to be taking notes. Writing helps me remember [and] I’m faster with writing than typing.”

Female Astronomy student

“...I feel phones can definitely be a distraction if you let them, but if you’re using your phone when you have a minute between taking notes or while the professor is going back and discussing something he just talked about, you can use your phone… I don’t find my phone distracting in that sense. But I think a lot of people feel it’s so important that they always have to be connected to somebody.”

Male Geology student

If somebody else wants to bring their computer, fine, but I do find it distracting. (You said somebody was looking at theirs today?) Yeah, he was sitting diagonally in front of me and watching an episode of… I don’t know, something I’ve never seen before. But it still distracted me. I would find myself every once in a while kind of looking down at it, and I’m like, “No, no!” … It’s like an unconscious [behavior]. I was trying really hard to pay attention… But every once in a while I still catch myself going, “Look, they’re chatting with somebody.” And I’m like, “Not good.” And it’s not my fault.”

Female Geology student

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